The Siemens regenerative flat-flame burner, as will be noticed from the accompanying illustration, is a lamp of a quite different character from the one just described, burning as it does within an inclosing glass, the previous lamp being quite open to the air. The lamps exhibited consumed from 7 to 8 feet of gas each per hour, and are of various ornamental forms. It consists simply of an ordinary bat's-wing burner supplied with hot air through perforated plates, which are heated by the waste heat from the products of combustion, and by radiant heat communicated to the perforated plates. The advantages of this form of lamp are those of construction, application, and economy. The principal parts of the regenerator consist of simple castings, whilst the only wearing part is the tip or burner, which is, as already stated, of the ordinary kind, and may be easily replaced at trifling cost. It can be fitted to the ceiling of a room like any other gas-lamp, or may be connected up to a chimney, so that the products of combustion may be withdrawn from the apartment. There is a provision for lighting this lamp without removing the glass globe, the glass being sufficiently far removed from the flame not to receive any deposit upon its surface. With a consumption of 7·2 cubic feet of gas per hour, this lamp has been found to give without reflector a light equal to 72 sperm candles, or 10 candles per cubic foot, being more than three times the light produced by ordinary gas-burners, whilst if three flames are inclosed in the same lamp the efficiency obtained is still higher.

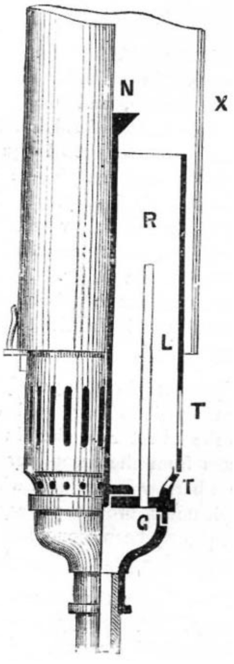

Fig. 3.

A third form of burner is Siemens's improved argand. This is not a regenerative gas-burner properly so called, and hence the economy is not so great as in either of the burners previously described. Instead of utilizing the waste heat of the products of combustion, in this burner the heat of the lower or non-luminous portion of the flame is applied for the purpose of heating up the air which is supplied to the burner. The sketch shows the arrangement in half-section. It consists of gas chamber, G, and tubes, R, from which the gas issues and is burnt; a metal stem, N, rises a certain height above the top of the gas-tubes, serving the double purpose of improving the form of the flame and conducting a certain amount of heat down to assist in heating the air supplied to the burner. The air enters through the slots T, in the lower portion of the cylindrical case L, which surrounds it, a hot chamber being thus formed, from which the heated air passes to the flame. A glass chimney, X, incloses the flame as in the ordinary argand burner.

By means of this lamp an intense white light is produced with some economy of gas, the light produced with 6 cubic feet of gas being 26 candles, or 4·33 candles per cubic foot per hour, as compared with 3·2 in the ordinary form of argand burner. When an opal glass shade or reflector is used, throwing down a portion of the light, this burner gives a light of 6·33 candles per cubic foot. Its applications are various, but it is mainly applied for reading and desk purposes.

Mr. Siemens, in reply to a vote of thanks, said that the only economical way of burning gas was with the application of regenerators. This had already been proved by both the late Sir William Siemens and Mr. Frederick Siemens as regards furnaces for industrial purposes, and it is now being exemplified by Mr. Frederick Siemens in the domestic applications of gas.

NOTES.

The University of Cambridge has sustained a severe loss by the death of Mr. Coutts Trotter. He died on Sunday morning last. Next week we shall give some account of his services to his University and to science.

The United States Chief Signal Office has suppressed both its mountain stations, Pike's Peak and Mount Washington. The latter was suppressed at Michaelmas. The grounds alleged are—the reduction of the grant by Congress, which has been very serious, and, further, inability to use the reports in forecasting.

The Chief Signal Officer (Washington) has issued a circular, dated November 10 last, stating that, in view of the large number of letters he has received deprecating the discontinuance on January 1, 1888, of the International Meteorological Observations (see Nature, vol. xxxvi. p. 545), he has decided to continue to receive such observations, made at noon, Greenwich time, after that date. He does not promise to publish them as regularly as heretofore, but he will do what he can to give observers some return for their labours in the interests of the science of meteorology.

The *Annalen der Hydrographie und Maritimen Meteorologie* for November contains the first part of the explanatory text of the daily synoptic charts of the North Atlantic Ocean for the winter quarter of 1883-84, together with charts showing the positions of the principal barometric maxima and maxima (see Nature, vol. xxxvi. p. 159). The depressions of January 22-31 are of especial interest, as they include the lowest barometrical reading ever recorded in Europe, viz. 27·332 inches at Ochtertyre, near Crieff, N.B., on January 26, 1884. The readings nearest to this are 27·33 inches, about 6° further south in the Atlantic, on February 5, 1870, and even 27·245 inches in Iceland on February 4, 1824. A still lower reading has lately been quoted for False Point (Nature, November 17, p. 68). The storm of January 26-27 was also remarkable for the rapid fall before, and the rapid rise after, the minimum pressure.

The Monthly Weather Charts of the Bay of Bengal and adjacent sea north of the equator, recently published by the Meteorological Department of India, very clearly illustrate the distribution of pressure, wind, and currents, as well as the changes of the monsoons, in those parts. The charts have been prepared from data for the years 1855-78, and supplied by the Meteorological Council, at the expense of the Indian Office. Each chart is accompanied by explanatory text.

Last Saturday there was a severe earthquake in Calabria. Two shocks were felt: one at 5 o'clock in the morning, the other two hours later. Both shocks were felt all over the province of Cosenza, but the second was by far the most violent. All the signalmen's huts on the railway near Sibari were destroyed for a distance of 8 kilometres. The station of Lattarico was also destroyed. At Paola the barracks and the Prefecture and Communal buildings were damaged; at Rogliano and Gravina several houses fell, and all the others were seriously shaken; and at San Marco part of the monastery fell. The results were most disastrous at Bisignano, the greater part of which was destroyed. More than twenty persons were killed, and about seventy injured. The parish priest of Bisignano, after having made his escape from the church, re-entered it, when the building fell in, and he was killed. The results at Bisignano would have been even more terrible, had not most of the inhabitants, alarmed by the first shock, fled from their houses. It is said that 900 houses are in ruins.

A correspondent writes to us from Blackburn:—"A shock of earthquake occurred at Chorley, Lancashire, on December 1, at about 10 minutes to 7 o'clock a.m. It was also felt over a wide area. At Blackburn, two distinct vibrations were felt. The direction of the disturbance appeared to be from south-west to north-east."

On November 5, at 7.16 p.m., a severe shock of earthquake was felt at Bodö, on the north-west coast of Norway. Houses shook, and several objects on walls fell down. There was only one shock, and it lasted about half a second.

On the evening of November 21, at 5.18 p.m., a magnificent meteor was observed in the neighbourhood of Stavanger, on the west coast of Norway. It first appeared in the western sky, and, having described a semicircle, disappeared below the horizon. Its size was that of a child's head, and its light a brilliant white. The weather was fine and starry at the time.

Mr. John Aitken has contributed to the Proceedings of the Royal Society of Edinburgh an interesting note on the formation of hoar-frost. Experiments were made with a sheet of glass exposed horizontally near the ground. During the deposition of dew the windward edges were generally dry, because the air has to travel over the cold plate before its temperature is reduced to the dew-point; but, when hoar-frost is deposited, the windward edges of the plate have the heaviest deposit. In this case the air seems to act as if it were supersaturated. Although this is impossible in ordinary conditions, the author shows that, if we have a water suface and an ice one at the same temperature, the vapour will tend to pass from the water to the ice, because the vapour-pressure of water is the higher; and he concludes that something like this takes place when hoar-frost is forming, the air which is saturated to a water surface being supersaturated to an ice one.

Dr. Fridtjof Nansen, of the Bergen Museum, has announced his intention of attempting to cross the interior of Greenland next summer on *Ski*, viz. the snow-runners found so advantageous during the last Nordenskiöld expedition across that continent. It may be remembered what extraordinary progress the Lapps made at that time on these Scandinavian means of locomotion across snow-fields. Dr. Nansen, who has on a former occasion visited the inland ice in Greenland, has placed his plan before Baron Nordenskiöld, who fully believes in its realization, and is giving Dr. Nansen every assistance. The explorer purposes crossing from the east to the west coast, the reverse of Baron Nordenskiöld's attempt.

An important paper by Prof. Lothar Meyer, upon the subject of "oxygen carriers," will be found in the current number of the *Berichte*. It embodies the results of a systematic series of experiments in which currents of oxygen and sulphur dioxide gases were simultaneously passed for some hours through solutions of certain salts of known strength contained in flasks heated upon the water-bath. At the end of each experiment the sulphur dioxide remaining in solution was expelled by a current of carbon dioxide, and finally a determination was made of the amount of sulphuric acid formed by oxidation of the sulphur dioxide. The results show that the salts of certain metals exert a most remarkable action in causing the union of oxygen with sulphur dioxide. The most active of all is manganous sulphate, $MnSO_4 . 5H_2O$, 2·4 grammes of which, dissolved in 200 c.c. of water, caused the formation of no less than six times as much sulphuric acid as that originally contained in the salt; that is, for every molecule of the sulphate employed, five molecules of free acid were synthesized. Manganese chloride under like circumstances was also found to act as an energetic oxygen carrier, one molecule of $MnCl_2 . 4H_2O$ causing the formation of 4·3 molecules of free sulphuric acid. Copper salts were next experimented upon, and a 3 per cent. solution of the sulphate, $CuSO_4 . 5H_2O$, was found to be most effective, one molecule causing the production of about a molecule of the acid. Both cuprous and cupric chlorides, the former in spite of its insolubility, act even more energetically than the sulphate, while the oxide hydrate, and, metal itself also work in a lesser degree. In a similar manner salts of iron, cobalt, nickel, zinc, cadmium, and magnesium were found capable of causing the oxidation of sulphurous acid, while salts of thallium and potassium merely acted like pure water, being absolutely powerless in this respect. These remarkable results are due, in the opinion of Prof. Meyer, to alternate oxidations and reductions, and this is certainly very strongly supported by the fact that those metals act most powerfully which readily pass from one stage of oxidation to another. As zinc, cadmium, and magnesium are also found to act in this manner, it is presumed that these metals have also an inclination to form sub-salts which have never yet been prepared.

Some days ago a peasant ploughing at Tjöring, in Denmark, unearthed a handsome armlet of pure gold weighing 12 ounces, which, according to the Director of the Museum of Antiquities in Copenhagen, dates from the second or third century A.D. There was formerly a barrow in the field where the armlet was found, and flint implements, broken pottery containing decayed bones, &c., have frequently been brought to light; but all traces of the barrow have now disappeared through ploughing.

It is reported from India that Mr. Rea, of the Madras Archæological Survey, has recently excavated some ancient burial-places at Dadampatti, Paravai, and other places in the Presidency, and investigated the cromlechs near Kodaikanaul. He has obtained a considerable collection of ancient pottery, and in some of the tombs found a large number of bones and a complete human skull. The latter had been filled up and inclosed in soft clay, so that its contour and characteristics are perfectly preserved. Mr. Rea also brought away a small specimen of a pyriform tomb.

Last Thursday, Sir John Lubbock read a paper before the Linnean Society, in continuation of his previous memoirs, on "The Habits of Ants, Bees, and Wasps." He said it was generally stated that our English slave-making ant (*Formica sanguinea*), far from being entirely dependent on slaves, as was the case with *Polyergus rufescens*, the slave-making ant *par excellence*, was really able to live alone, and that the slaves were only, so to say, a luxury. Some of his observations appeared to throw doubt on this. In one of his nests the ants were prevented from making any fresh capture of slaves. Under these circumstances, the number of slaves gradually diminished, and at length the last died. At that time there were some fifty of the mistresses still remaining. These, however, rapidly died off, until at the end of June 1886 there were only six remaining. He then placed near the door of the nest some pupæ of *Formica fusca*, the slave ant. These were at once carried in and soon came to maturity. The mortality among the mistresses at once ceased, and from that day to this only two more have died. This seems to show that the slaves perform some indispensable function in the nest, though what that is still remains to be discovered. As regards the longevity of ants, he said that the old queen ant, which had more than once been mentioned to the Society, was still alive. She must now be fourteen years old, and still laid fertile eggs, to the important physiological bearing of which fact he called special attention. He discussed the observations and remarks of Graber as regards the senses of ants, with special reference to their sensibility towards the ultra-violet rays, and referred to the observations of Forel, which confirmed those he had previously laid before the Society. Prof. Graber had also questioned some experiments with reference to smell. He, however, maintained the accuracy of his observations, and pointed out that Graber had overlooked some of the precautions which he had taken; his experiments seemed to leave no doubt as to the existence of a delicate sense of smell among ants. As regards the recognition of friends, he repeated some previous experiments with the same results. He took some pupæ from one of his nests (A) and placed these under charge of some ants from another nest (B) of the same species. After they had come to maturity, he placed some in nest A and some in nest B. Those placed in their own nest were received amicably, those in the nests of their nurses were attacked and driven out. This showed that the recognition is not by the means of a sign or password, for in that case they would have been recognized in nest B and not in nest A. Dr. Warsmann had confirmed his observations in opposition to the statement of Lespis, that white ants are enemies to those of another nest, even belonging to the same species; the domestic animals, on the other hand, can be transferred from one nest to another, and will be amicably received. In conclusion, he discussed the respective functions of the eyes and ocelli, and referred to several other observations on various interesting points in the economy of the Social Hymenoptera.

IN an interesting paper read the other day before the National Academy of Sciences, New York, Prof. W. P. Trowbridge gave an account of a discovery which had lately been made by his son. This discovery is that birds of prey and some others have the power to lock securely together those parts of the wing holding the extended feathers, and corresponding to the fingers of the human hand. The action of the air on the wing in this condition extends the elbow, which is prevented from opening too far by a cartilage, and the wings may keep this position for an indefinite length of time, with no muscular action whatever on the part of the bird. While resting in this way, the bird cannot rise in a still atmosphere; but, if there be a horizontal current, it may allow itself to be carried along by it, with a slight tendency downward, and so gain a momentum by which, with a slight change of direction, it may rise to some extent, still without muscular action of the wings. Prof. Trowbridge also believed it quite possible for a bird to sleep on the wing. In discussing this paper, Prof. J. S. Newberry said that he had once shot a bird which came slowly to the ground as if still flying, but reached it dead. He believed that it had died high in the air; but he had never been able to account for the manner of its descent till now, when he found an explanation in the statement of Prof. Trowbridge.

THE cultivation of oysters in France appears to have greatly increased of late. Thus, while in 1885 the number exported was 30,000,000, 35,000,000 have been exported in the first eight months of 1887 (twice as much as in the corresponding part of 1886), and the total for the year will probably be about 52,000,000. At the same time the importation into France from Portugal has been declining. Thus, from 154,647 kilogrammes in 1883, it had fallen to 1500 kilogrammes in 1885, and no figures are forthcoming for the first eight months of 1887.

IN his Report for 1886-87, presented to the Parliament of Tasmania, Mr. Saville-Kent speaks of the oyster-fisheries on the Tasmanian coast-line. The results obtained during the past year, from the series of Government oyster-reserves established in accordance with Mr. Saville-Kent's recommendations, seem to him to justify the opinion that, with an extension of the same system, conducted on scientific principles, the produce of these reserves, combined with that raised on the private beds, will be sufficient within the course of a few years to establish once more a lucrative oyster trade in the colony. At all of the several reserves there has been an abundant fall of spat, but more especially in those of the Spring Bay district. This locality, Mr. Saville-Kent anticipates, will, as in former years, become the chief station of the Tasmanian oyster-fishery. The number of breeding-oysters at present laid down upon the various Government reserves may be reckoned at about 150,000; to these may be added, as the produce of the past year's spatting season, at least an equal number of young brood. A further supply of 100,000 adult stock, for placing on the additional reserves projected or in course of construction, will be obtained from the natural beds during the current year.

MR. HARRY PAGE WOODWARD (eldest son of Dr. Henry Woodward, F.R.S.), who had served for more than three years, under Mr. H. Y. Lyell Brown, as Assistant Government Geologist in South Australia, has, by the advice and upon the recommendation of Dr. A. Geikie, F.R.S., Director-General of the Geological Survey of Great Britain, been appointed by the Secretary of State for the Colonies to the post of Government Geologist for Western Australia. Mr. Woodward sailed for King George's Sound in the P. and O. steam-ship *Shannon* on the 2nd inst.

A PECULIAR phenomenon is being noticed in the large lakes near the village of Mazuren (near Gumbinnen, Prussia). The level of the water is continually decreasing; during the last ten years it has fallen 1 metre annually, so that many of the islands in the lakes have now become peninsulas.

THE People's Lectures, begun under the auspices of the London Society for the Extension of University Teaching, have attracted large audiences, and there is no reason to doubt that the success hitherto achieved will be maintained. Yesterday evening, Prof. H. G. Seeley, F.R.S., delivered, at the Great Assembly Hall, Mile End Road, the first of a course of three lectures on "Glimpses into Nature's Workshop." The special subject of this lecture was "Water, the Earth Leveller." The next two lectures of the course—"Ice, the Earth Engraver," and "Underground Heat, the Earth Moulder and Modeller"—will be delivered on December 14 and 21, at the Memorial Hall, London Street, Bethnal Green.

ANOTHER series of lectures at the Memorial Hall, London Street, Bethnal Green, is likely to be of good service. It is intended especially for working lads, and the lectures are called "Science Talks." Last Thursday, Dr. Gerard Smith delivered a lecture on "The Structure of Trees and Plants"; and this evening he will lecture again, taking as his subject "Microscopic Life in the Sea." On December 15, Mr. C. A. Newton will lecture on "The Wonders of the Heavens."

A CONFERENCE on Technical Education will be held at the Royal Victoria Hall, Waterloo Bridge Road, on Wednesday, the 14th inst. Sir Henry Doulton will take the chair. Two short papers—one by Dr. Fleming, of University College, the other by Mr. Bochett, a working man—will be read; and it has been arranged that the reading of these papers shall be followed by a discussion. It is hoped that employers and employed will both be largely represented at the meeting. The Hon. Secretary will be glad to send tickets for the platform or for reserved seats to anyone who may apply for them.

IN the Report of the Newcastle Public Libraries Committee for 1886-87, it is stated that, at the annual stock-taking in June-July 1886, only three volumes were found to be unaccounted for. Only sixteen volumes have been lost since the opening of the Library in 1880. During the same period the issue of volumes has reached a total of 1,538,445.

A NEW edition of the catalogue of books in the juvenile lending department connected with Newcastle Public Library has just been issued. A glance at the contents, as the compiler truly says, will show that in this juvenile department "a wonderful wealth of entertainment is placed at the command of the young people of Newcastle." No fewer than two thousand carefully selected volumes are at their disposal. During the seven years the Library has been open, the Committee has more than doubled the stock of books in this collection, and 215,092 volumes have been lent to children.

A VISITOR to the beaver colony at Amlid, some distance from Christiansand, in Norway, to which we referred some months ago, states that the colony has flourished considerably during the summer, and is now probably the largest in Norway. Sometimes as many as a dozen animals may be seen at a time in the water. The huts are built close to the shore, and have two stories, one above and one below the surface of the water. The walls are made of timber, laid as in a human dwelling, whilst the roof is covered with twigs and mud. All the aspen-trees in the vicinity have now been felled, and the animals have begun to attack the birches. Trees upwards of 18 inches in diameter at the root have been cut down. The animals appear to have most use for the branches, many stems stripped of the same lying about in the woods. The material required is dragged to the waterside along regular "log runs," such as wood-cutters leave in forests, and in some places roots crossing the same have been gnawed off, so as to make the run smooth. Shortly after an increase in the colony the new-comers begin to build a new house. Not one of the animals has as yet been killed, and visitors come from all parts for the purpose of watching their peculiar mode of living. It has been found that sentinels are posted, giving the alarm to the rest of the colony in case of danger. When such an alarm is given, all the animals leave their dwellings for the water.

READERS of Icelandic Sagas will remember that in the celebrated Njal's Saga there is a record of an attack on Njal's dwelling, Bergthorshval (named after his wife, Bergthora), and of its being burned, with the whole of Njal's kin. In order to demonstrate the historical accuracy of the Saga, a member of the Iceland Archæological Society some two years ago proposed to excavate the spot where Njal's dwelling was said to have stood. This was done last year, and resulted in the discovery, at a depth of some 6 feet, of a layer of ashes, remains of charred beams, &c. But this was not all. Below the ashes three lumps of some substance of a spongy nature, dirty-white in colour, were found; and Dr. Storch, Director of the Royal Agricultural Laboratory in Copenhagen, by whom these lumps have just been analyzed, pronounces them to be ancient curdled milk and cheese. Such milk, called *Skyr*, was much liked in Iceland in remote times, and was often solidified to a kind of cheese by the fluid matter being pressed out. Strangely enough, the Saga mentions the fact of women bringing *Skyr* to extinguish the fire. Dr. Storch, by slowly treating fresh *Skyr* to a temperature of a little more than 100° C., has thereby obtained a substance in every respect similar to that found in the supposed ruins of Njal's dwelling.

THE additions to the Zoological Society's Gardens during the past week include a Striped Hyæna (*Hyæna striata*) from North Africa, presented by Mr. Ernest Heydon Marquis; a Crested Porcupine (*Hystrix cristata*) from Suakim, presented by His Grace the Duke of Hamilton, K.T., F.Z.S.; two Common Squirrels (*Sciurus vulgaris*), British, presented by Mrs. Henry Alex. Hankey; a Horned Tragopan (*Ceriornis satyra* ♂) from the South-eastern Himalayas, presented by Mr. R. J. Lloyd Price; a Vinaceous Dove (*Turtur vinaceus*) from West Africa, presented by Mr. R. H. Mitford; three South African Scorpions (*Scorpio* ——) from South Africa, presented by Mr. W. K. Sibley; a Zebu (*Bos indicus*) from Africa, two Sandwich Island Geese (*Bernicla sandvicensis*) from the Sandwich Islands, deposited.

OUR ASTRONOMICAL COLUMN.

THE NEW ALGOL VARIABLES, Y CYGNI AND R CANIS MAJORIS.—Mr. Chandler has just published in *Gould's Astronomical Journal*, No. 163, his elements for these two interesting variables. In the case of Y Cygni, it will be recollected (see NATURE, vol. xxxv. pp. 307, 329) that before its period had been fully determined by observation, Mr. Chandler concluded, from the analogy of all the then known stars of the type, that it would prove to be about thirty-six hours. This is now found to be correct, the actual period being 1d. 11h. 56m. 48s. The ground upon which the inference was based was the circumstance that with the other stars of the type the shorter the period of the star the higher is the ratio which the time of oscillation bears to the entire period. The first exception to this rule is R Canis Majoris, the variable star discovered by Mr. Sawyer last March (see NATURE, vol. xxxvi. p. 376), the duration of the oscillation for this star being 5h. instead of 6h., as it should be on the same principle.

The following are the elements of the two stars:—

	Y Cygni.	R Canis Majoris.
Epoch	1886, Dec. 9, 11h. 14m. 30s.	1887, Mar. 26, 14h. 58m. 30s.
Period ...	1d. 11h. 56m. 48s.	1d. 3h. 15m. 55s.
Brightness at maximum	7·1m.	5·9m.
Brightness at minimum	7·9m.	6·7m.
Duration of decrease ...	4h.	2·5h.
Duration of increase ...	4h.	2·5h.
Stationary maximum brilliancy	28h.	22h.

MINOR PLANET NO. 271.—This object has received the name of Penthesilea.

ASTRONOMICAL PHENOMENA FOR THE WEEK 1887 DECEMBER 11-17.

(FOR the reckoning of time the civil day, commencing at Greenwich mean midnight, counting the hours on to 24, is here employed.)

At Greenwich on December 11

Sun rises, 7h. 58m.; souths, 11h. 53m. 22·9s.; sets, 15h. 49m.: right asc. on meridian, 17h. 12·9m.; decl. 23° 1′ S. Sidereal Time at Sunset, 21h. 9m.

Moon (New on December 14, 19h.) rises, 3h. 11m.; souths, 8h. 47m.; sets, 14h. 14m.: right asc. on meridian, 14h. 6·5m.; decl. 7° 27′ S.

Planet.	Rises. h. m.	Souths. h. m.	Sets. h. m.	Right asc. and declination on meridian. h. m.	 ° ′
Mercury..	6 7	10 32	14 57	15 51·2	18 26 S.
Venus.....	3 33	8 46	13 59	14 4·9	9 56 S.
Mars......	0 47	6 54	13 1	12 12·5	0 44 N.
Jupiter....	5 37	10 6	14 35	15 24·9	17 47 S.
Saturn....	19 28*	3 16	11 4	8 34·1	19 10 N.
Uranus...	2 9	7 43	13 17	13 1·6	5 52 S.
Neptune..	14 44	22 24	6 4*	3 45·0	18 3 N.

* Indicates that the rising is that of the preceding evening and the setting that of the following morning.